



MEMORANDUM

EUGENE WATER & ELECTRIC BOARD

Rely on us.

TO: Commissioners Carlson, Mital, Helgeson, Schlossberg and Brown
FROM: Michael McCann, Electric Generation Manager
DATE: August 22, 2019
SUBJECT: Consideration of Hydrogen as an Alternative Fuel
OBJECTIVE: Informational Only

Background

On Thursday, August 1, EWEB hosted a Hydrogen Roundtable event in our north building that was organized by Congressman Peter DeFazio's office. The roundtable, which kicked off with remarks by General Manager Lawson and Congressman DeFazio, included speakers from EWEB, Northwest Natural Gas, Oregon State University, the Columbia-Willamette Clean Cities Coalition, Toyota and the Renewable Hydrogen Association (RHA). The event also showcased a Hydrostar solar-power electrolyzer and a Toyota Mirai, a hydrogen fuel cell passenger vehicle. The event was open to invited public officials and staff from the region and about 50 people were in attendance for the presentations.

Discussion

EWEB has been interested in hydrogen as an alternative energy source for a number of years as news of its deployment and use across Europe and in eastern North America started to gain traction. In 2016, the Electric Generation Department commissioned a study by Good Company, a Eugene-based sustainability consulting firm, to evaluate the viability of EWEB using electrolysis to produce hydrogen using excess water and electricity that could then be stored for use as a resiliency fuel or converted back into electricity when prices dictated. The Good Co. study indicated that EWEB could cheaply and easily produce more hydrogen than we would need for our own purposes, and that project scale was important to improve project economics. We then started having discussions with regional utility partners to learn what others were considering.

This initial work led to partnerships with Northwest Natural, Oregon State University and others who are looking to take advantage of hydrogen's potential to help decarbonize our energy sectors and provide a resiliency hedge in the event of a large-scale natural disaster in the Northwest. In 2018, EWEB joined the RHA as a founding member to further explore and facilitate opportunities for the advancement of hydrogen's development as an alternative fuel. EWEB is now one of eight utility members in RHA, with the others being Douglas County PUD, Fortis BC, Klickitat County PUD, Northwest Natural, Tacoma Power, Puget Sound Energy, and Portland General.

EWEB is interested in renewable hydrogen both because it can help us meet some of the challenges in attaining the clean energy future we need as a society and because we believe that hydrogen is an important component in building resilient utility infrastructure here in the PNW. As a utility that both produces electricity and buys and sells power on the wholesale market, we find ourselves at times with an oversupply of low cost, carbon-free, green energy. When this happens, dispatchable generation is turned off. We spill more water and we curtail our wind resources. While this tends to affect large power producers, like BPA, our own Harvest Wind facility routinely gets curtailed in the spring due to oversupply. Not only are we giving up carbon-free energy during curtailment, the shutdown hurts project economics.

At other times of the year, typically mid-winter for heating loads and late summer for cooling loads, demand exceeds supply and all available resources are generating electricity. Sometimes even that isn't enough and we import electricity into our region, largely from coal and other hydrocarbon-intensive resources located to our east. It is not uncommon in the Northwest, for instance, to have very little solar, wind and hydroelectricity available during a typical winter cold snap, and during this period we are importing carbon-intensive energy. Most of EWEB's electricity-linked carbon footprint comes from purchases made by BPA during these periods.

Imagine if we had a hydrogen electrolyzer taking price and environmental signals from the market. When prices call for it and clean energy is plentiful, we generate hydrogen. At other times, when electricity prices are higher and clean energy is less available, our electrolyzer is in standby mode and our green energy is feeding the grid. From a generation standpoint, our renewable resources are now being utilized to their greatest extent. The hydrogen we've just produced can then be used in the natural gas system, as a transportation fuel and as industrial feedstock for making fertilizer, for instance. It can also be stored for future use, either with natural gas or separately, to help address the winter heating or summer cooling peaks where capacity might be an issue. Finally, using a fuel cell, it can be turned back into electricity if that's what the market dictates. From an energy standpoint, that is where we see the importance and value in renewable, or green, hydrogen. We are converting available renewable energy into another form, hydrogen, that can be used to help decarbonize other energy sectors or stored for later use to displace carbon-intensive resources.

We also believe that hydrogen can be part of EWEB's resilient future. Hydrogen fuel cells can operate water pump stations and emergency drinking water wells. They can also help black start a localized electric grid and provide grid stability as we add local critical loads like police, fire and hospitals to our system. Finally, because fuel cells are roughly twice as efficient as internal combustion engines, fuel cells can operate for significantly longer periods without refueling than standard emergency generators.

The green hydrogen market is still in its infancy, especially in the Northwest. There are hydrogen vehicle fueling stations in California and in British Columbia, but none in the area between. Northwest Natural has yet to determine how much hydrogen they are comfortable injecting into their system, and auxiliary markets for green hydrogen in agriculture and industrial applications have yet to develop. But EWEB is participating because we see both the need and the potential. We recently joined Northwest Natural and Oregon State University in a grant application made to the US Department of Energy for funding to study the economic dispatch of a hydrogen electrolyzer that would feed the energy and transportation sectors. While we weren't successful in that funding opportunity, the collaboration and partnerships formed in the pursuit will allow EWEB to continue hydrogen development discussions with others in the region as the technology matures.